

ATTACHMENT D

ATTACHMENTS TO COMMENT LETTER 0070

Final Report

High-Speed Rail Summary Report and Action Plan



prepared for

Intercity High-Speed Rail Commission

December 1996



Intercity High Speed Rail Commission

P. O. Box 942874, MS-74
Sacramento, CA 94274-0001

December 13, 1996

MEMBERS OF THE LEGISLATURE

The State Legislature
State Capitol
Sacramento, CA 95814

Dear Members:

This transmits the Intercity High Speed Rail Commission's High Speed Rail Summary Report and Action Plan, as required by Resolution Chapter 56 of 1993. The Report summarizes the results of four technical studies undertaken by the Commission, the Public Participation Program as well as the Commission's findings and recommendations.

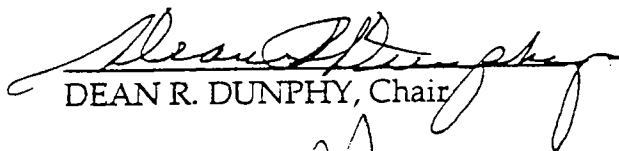
The Commission was created to investigate the feasibility of implementing a high speed rail system linking California's metropolitan areas and developing a framework for implementing the system. To accomplish this mandate, it was necessary to develop a conceptual high speed rail system. We believe that for high-speed rail to move forward, it is necessary to start with such a tangible vision and then modify it as necessary.

The Commission intends for the Report to act as a blueprint for high-speed passenger rail service in California – one which may be adjusted at later stages of the project implementation process. It is critical to retain some degree of flexibility until the project is environmentally cleared and an agreement has been negotiated with private partners. Final route selection will ultimately be the responsibility of the High Speed Rail Authority which was established by Senate Bill 1420.

The Commission has concluded that a high speed rail passenger system as described in the attached Report is technically, environmentally and economically feasible once constructed, and would be operationally self sufficient. Moreover, the benefit/cost analysis indicates that the system will be beneficial to the State's economy and will enhance California's competitiveness in a global market. However, substantial public financing will be needed to construct the system.

The draft Report was circulated for review and comment to county and regional transportation planning agencies, metropolitan planning organizations, airport operators, public representatives, the California Transportation Commission and interested individuals. Three public hearings were held to solicit comments on the draft Report. These comments were considered when making our final recommendations.

Questions regarding the attached Report may be directed to Mr. Dean Dunphy, Chair of the Commission, at (916) 323-5400 or Mr. Dan Leavitt, the Commission's Executive Director, at (916) 324-1541.



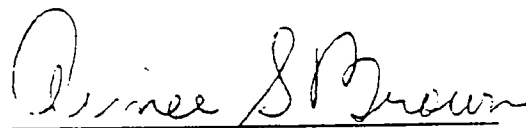
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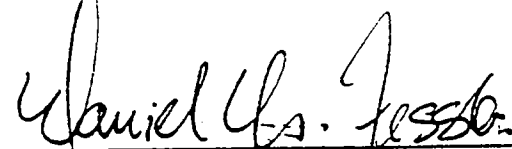
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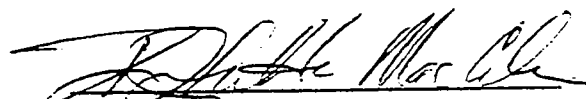
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Intercity High Speed Rail Commission

P. O. Box 942874, MS-74
Sacramento, CA 94274-0001



January 1997

HIGH SPEED RAIL STAKEHOLDER:

Enclosed is the *California High Speed Rail Summary Report and Action Plan*. The Report summarizes the results of four technical studies undertaken by the Intercity High Speed Rail Commission, the Public Participation Program as well as the Commission's findings and recommendations. The Commission intends for the Report to act as a blueprint for high-speed passenger rail service in California.

The Commission was created to investigate the feasibility of implementing a high speed rail (HSR) system linking California's metropolitan areas and developing a framework for implementing the system. The Commission has concluded that a HSR passenger system as described in the attached Report is technically, environmentally and economically feasible once constructed, and would be operationally self sufficient. Moreover, the benefit/cost analysis indicates that the system will be beneficial to the State's economy and will enhance California's competitiveness in a global market. However, substantial public financing will be needed to construct the system.

The Commission dissolves upon the submittal of this Report to the Governor and Legislature. However, the effort to implement HSR in California will be carried out by the High Speed Rail Authority which was established by Senate Bill 1420 of 1996.

Additional copies of the enclosed report are available by calling the Department of Transportation's Publication Office at (916) 445-3520. For questions regarding the findings and recommendations contained in this Report and/or ongoing HSR efforts in California, please leave a message at (916) 324-1548, and a staff member will get back to you.

DANIEL S. LEAVITT
Executive Director

Enclosure

Final Report

High-Speed Rail Summary Report and Action Plan



prepared for

Intercity High-Speed Rail Commission

December 1996



Intercity High Speed Rail Commission

P. O. Box 942874, MS-74
Sacramento, CA 94274-0001

December 13, 1996

HONORABLE PETE WILSON
Governor of California
State Capitol
Sacramento, CA 95814

Dear Governor Wilson:

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The Commission was created to investigate the feasibility of implementing a high speed rail system linking California's metropolitan areas and developing a framework for implementing the system. To accomplish this mandate, it was necessary to develop a conceptual high speed rail system. We believe that for high-speed rail to move forward, it is necessary to start with such a tangible vision and then modify it as necessary.

The Commission intends for the Report to act as a blueprint for high-speed passenger rail service in California – one which may be adjusted at later stages of the project implementation process. It is critical to retain some degree of flexibility until the project is environmentally cleared and an agreement has been negotiated with private partners. Final route selection will ultimately be the responsibility of the High Speed Rail Authority which was established by Senate Bill 1420.

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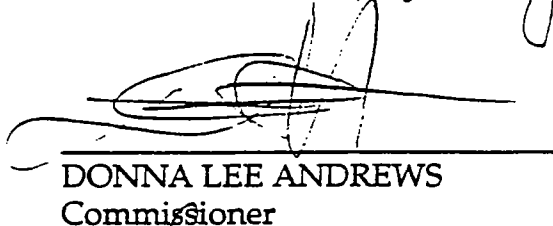
Questions regarding the attached Report may be directed to Mr. Dean Dunphy, Chair of the Commission, at (916) 323-5400 or Mr. Dan Leavitt, the Commission's Executive Director, at (916) 324-1541.



DEAN R. DUNPHY, Chair



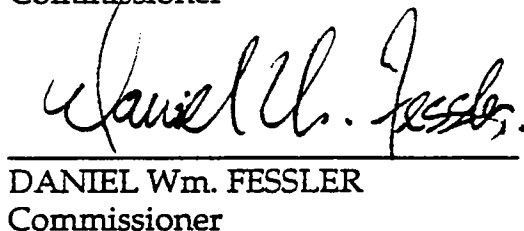
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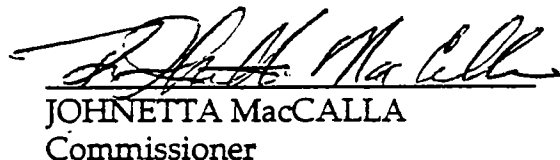
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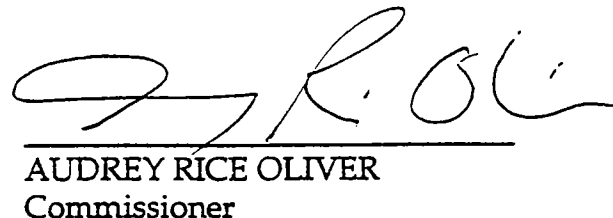
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Acknowledgments

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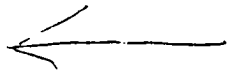


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Independent Ridership and Passenger Revenue Projections for High-Speed Rail Alternatives in California

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- Charles River Associates



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- Applied Management & Planning Group
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- Dowling Associates
- McGuire & Company
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- Sabre Decision Technologies
- Cara Rice & Associates
- DeVenuta & Associates
- Hickling Corporation

High Speed Rail Corridor Evaluation and Environmental Constraints

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- Parsons Brinkerhoff

Subcontractors

- Jenkins, Gales & Martinez, Inc.
- John Knutzen & Associates
- Sharon Greene & Associates
- Woodward-Clyde Consultants

Institutional Analysis and Financing Options

Prime Contractor

- Public Financial Management, Inc.

Subcontractors

- Nossaman Guthner, Knox & Elliott
- L.S. Gallegos & Associates
- Robinson & Pearman
- Sharon Greene & Associates
- Great Pacific Securities

Economic Impact and Benefit/Cost of High Speed Rail for California

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- Economics Research Associates

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Executive Summary

Executive Summary

■ Overview

California has always been a leader in designing and building transportation systems that support and enhance the lives of its citizens. To maintain the State's high quality of life and to support economic growth, California must seek new and better ways of meeting the transportation needs of a growing population. Intercity high-speed rail offers the California traveler a safe, convenient, and efficient alternative to highway and air travel that would complement these existing modes. High-speed rail systems have been in operation in Europe and Japan for over 30 years. During this time, the systems have carried over four billion passengers without a single train-related fatality and have proven to be an energy efficient, less polluting mode that strengthens urban centers.

To investigate whether this mode of intercity transportation might be appropriate for California, the Governor and Legislature authorized *Senate Concurrent Resolution 6* (SCR 6) in 1993. SCR 6 established the nine-member Intercity High Speed Rail Commission (the Commission) to develop a framework for implementation of a high-speed rail system in California. The focus of the Commission's work is on intercity travel, i.e., trips of between 100 and 500 miles in length, utilizing speed in excess of 200 miles per hour (mph).

The Commission's objectives include determining both the *feasibility* and *advisability* of high-speed rail in California. Feasibility is determined by factors such as engineering and environmental constraints and financial requirements. Advisability includes such issues as economic costs and benefits, the effect on California's economic competitiveness, broad quality of life issues, the equity of impact to different socioeconomic populations, and political acceptability.

SCR 6 specified that the Commission give first priority to developing a system connecting the San Francisco Bay Area with Los Angeles and then consider extensions to San Diego and Sacramento. To carry out its mandate, the Commission directed a series of technical studies to produce the background data for evaluation of the overall feasibility of such a system. This *Executive Summary* is a synopsis of the full *Summary Report and Action Plan* which presents the key findings and recommendations of the Commission.

The following five distinct technical studies, in addition to an extensive Public Participation Program, were conducted under the direction of the Commission to accomplish its objectives, each focusing on a particular aspect of high-speed rail feasibility or implementation:

- *Los Angeles-Bakersfield Preliminary Engineering Feasibility Study;*
- *Corridor Evaluation and Environmental Constraints Analysis;*

- *Ridership Demand/Market Analysis Study;*
- *Economic Impact and Modal Cost Comparison Study; and*
- *Institutional Analysis and Financing Options Evaluation.*

The Commission based its recommendations on findings from the technical studies in the areas of technology, route and station choices, ridership and revenue projections, economic impacts, and institutional and financial requirements. These findings and recommendations were documented in a draft *Summary Report*, which was circulated to local governments and agencies, community groups, legislators, and other stakeholders for a review and comment period.

In October 1996, the Commission hosted three public hearings on the draft *Summary Report and Action Plan* at various locations throughout the State. Following these hearings, the Commission finalized its findings and recommendations, taking into consideration the comments received through the public review process. This revised *Executive Summary* reflects the final *Summary Report and Action Plan* submitted to the Governor and Legislature. The report will serve as a blueprint for the recently established High Speed Rail Authority, which has been given the powers necessary to implement high-speed rail.

■ The Case for High-Speed Rail in California

There are numerous reasons why a high-speed rail system connecting the major population centers deserves the widespread support of the people of California. Aside from the projected economic benefits of the system summarized in the following section, there are many strategic considerations which, although not the focus of this study, should be heeded in any discussion of the program. Primary among these is the need to retain California's edge as the State competes in an increasingly global and high technology economy.

Future Mobility and Connectivity

The economic vitality and stability of California has depended historically upon the ability of people, goods, and information to move freely and efficiently between population centers, agricultural markets, and international ports of entry. This is true not only for the principal cities of Los Angeles, San Francisco, and San Diego but also for their respective metropolitan regions and for the Central Valley. A valid question is whether the highway and air travel systems that have served the State so well in the past can continue to maintain the degree of mobility necessary for continued economic growth and stability. Even with incremental capacity enhancements to the intercity highways and airports, it is likely that the historic functionality of these systems cannot be maintained at levels necessary to support anticipated population growth and travel demand. High-speed rail offers a complementary mode to air and highway which will provide the State with a substantially greater degree of intercity mobility in the future.

Although commercial airlines currently serve the Los Angeles–San Francisco Corridor well, air service to secondary markets such as Bakersfield and Fresno is less frequent and less competitively priced. In general, the Central Valley is rather poorly served by commercial air service, a situation unlikely to change. High-speed rail would improve the accessibility of the secondary markets and serve a growing Central Valley population.

Stability Through Diversity

California's current intercity modes of travel are highly dependent upon petroleum-based fuels. In the event of future disruption of supply or significant energy market dynamics, an electrically-powered high-speed rail system is less likely to be affected because of the wider array of electric power generation options such as natural gas, coal, and hydroelectric power.

In the face of a natural disaster, high-speed rail offers insurance against major disruptions to intercity travel, much as the Bay Area Rapid Transit (BART) system provided mobility in the Bay Area after the 1989 Loma Prieta earthquake. Less dramatically, the high-speed rail system would provide a means to directly access urban centers – bypassing the congested roadways leading from airports and intercity highway corridors.

For the Central Valley, a high-speed rail system would eliminate much of the uncertainty and unreliability of both current air and highway travel, which stems from extreme ground fog and other climatic conditions unique to the Valley at certain times.

Future Viability of California's Current Intercity Transportation Modes

Although the Commission's technical studies did not explicitly consider the feasibility of serving California's future intercity transportation demand through modes *other* than high-speed rail, it is clear that further capacity expansion of major airports in the State is problematic, due to public opposition arising from environmental impacts. Expansion of the freeway networks within the major metropolitan areas is unlikely for similar reasons as well as physical constraints. High-speed rail would offer an environmentally and physically feasible third alternative for accommodating future growth in intercity travel demand.

Although demand will continue to grow, it is unlikely that California's major airports can be significantly expanded to accommodate more landings and take-offs in the future. The available capacity of airports including Los Angeles International (LAX) and San Francisco International (SFO) will become more coveted for international and transcontinental flights, which generate greater economic benefits per operation. Through market forces, some percentage of the landing slots now used by lower revenue generating intrastate service could be reassigned to more lucrative international and long distance transcontinental flights. As a result, intrastate air service could become both less frequent and more expensive between the major California airports.

Strengthening Urban Centers

High-speed rail is a mode that strengthens urban centers. Unlike airports, high-speed rail stations may be woven into the heart of existing city centers without undue environmental impacts. As mentioned earlier, high-speed rail can bypass congested roadways in major metropolitan areas to provide a reliable means of accessing downtowns. In concert with suitable local land use and economic development policies, high-speed rail can help strengthen existing city centers by maintaining and improving accessibility.

Accommodating the Needs of California's Future Population

California's population is projected to grow from the current 32.7 million to 48.8 million by 2020, representing a 49 percent increase. In the inland valleys (the Inland Empire, the Antelope Valley, and the Central Valley) in particular, the percentage of growth will be quite substantial. Accommodating the travel demand of this increased population will be difficult with current modes for the reasons stated above.

At the same time, accommodating continued growth in population is synonymous with improving the long-term health and stability of the California economy. It is not a question of whether but how the state of California will grow. The state's growth requires a substantial reinvestment in transportation infrastructure to support the level of economic activity and quality of life that has raised California to its current position in national and global markets.

Image of the State

The Commission believes that high-speed rail would enhance the image of California as a desirable place to live and do business. The advanced technology involved in constructing and operating the system – everything from the latest in signaling, communications, and control systems to the most advanced structural engineering techniques – is consistent with California's reputation as a center of high technology. Implementation of the high-speed rail system would show that the State is committed to making the infrastructure investments necessary to sustain economic growth and quality of life.

As an important part of its efforts, the Commission explored the issue of equality and considered the human factor as it relates to this project. The Commission recognizes that California is a state of diverse cultures and interests. In order to build a system to serve California's diverse population, the succeeding Authority must remain committed to a philosophy that equal opportunity shall be afforded to all in the development of the system. This commitment is stated and reflected in this report and should continue throughout the life of the high-speed rail project.

■ Key Findings and Recommendations of the Commission

Overall Feasibility

Feasibility can be defined from many perspectives, including:

Financial – Even after allowing for all operating costs, including long-term maintenance and rehabilitation, the high-speed rail system is projected to generate surplus operating revenue, an impressive accomplishment for any passenger rail system. While the projected operating surplus generated by the system will contribute significantly to the capital financing plan, it is not sufficient to fully fund construction of the system or attract adequate private investment. Thus, substantial public funds will need to be identified for construction. This is not at all unusual for major infrastructure projects with large public benefits, such as highways and airports. However, if airfares or fuel prices were to increase substantially, rail fares also might be increased such that some or all of these public funds might be recovered in the form of higher system revenues.

Engineering and Technical – High-speed rail is feasible from a technical standpoint, even with California's unique geographic and seismic challenges. Numerous alternatives have been refined to address these challenges, and the cost estimates account for the higher cost of construction in the State.

Environmental – Because no "fatal flaws" have been discovered to date, there is no evidence to suggest that high-speed rail is infeasible from an environmental standpoint. Cost estimates of system construction include costs for mitigating currently known environmental impacts.

Political – High-speed rail can be politically feasible in California if the system concept is properly presented by its proponents and well understood by the public. Voters in the past have agreed to tax themselves for transportation and other worthwhile public infrastructure projects. If the broad and significant benefits of this project can be communicated to the public, political support could be achieved.

Technology

The Commission focused on systems capable of maximum operating speeds of at least 200 mph, selecting the electric traction Very High Speed (VHS) and magnetic levitation (Maglev) technologies for further consideration. Based upon current knowledge and experience in revenue service, the Commission recommends VHS technology. Beyond this, it is premature to specify a proprietary technology or manufacturer. The choices may be determined by the timing of system implementation. If begun immediately, VHS would be the only technology proven in extensive revenue service. If implementation is a longer-term process, however, future technology developments could make Maglev a more attractive option, particularly if manufacturers step forward with performance guarantees, financial incentives, or other offers.

As part of its technology evaluation, the Commission examined the potential for commercial freight service. While the equipment used by U.S. freight railroads is far too heavy and slow to be compatible with high-speed rail alignment and operational requirements, there is a market for freight compatible with high-speed operations. This market could include either overnight freight operations using specialized equipment or small package and express mail service. The system's conceptual financing plan benefits from assumed net freight revenues of \$20 million per year.

Alignment and Route

Early findings led the Commission to narrow the focus of the study to alignments within the State Route 99 (SR-99) Corridor through the Central Valley, rather than the Interstate 5 (I-5) Corridor through the Valley, or a coastal alignment. In addition to alignment variations within the SR-99 Corridor, the Commission also studied options involving different mountain passes, service to urban areas, and system extensions beyond Los Angeles or San Francisco. Although the Commission is making the following corridor-level recommendations, the final selection of an alignment is dependent upon preliminary engineering, final design, and the environmental clearance process.

General Findings on System Operations and Route

Several key characteristics of the recommended system are worth emphasizing:

- The primary purpose of the system will be to serve intercity passenger travel – trips between 100 and 500 miles.
- While the focus of the Commission's efforts was on systems capable of maximum operating speeds of at least 200 mph, maximum speeds through densely developed urban areas necessarily will be limited to 100-150 mph.
- High-speed trains must be separated from other incompatible rail services, such as conventional freight operations. Sharing tracks with other passenger or commuter services is possible if technical and operational issues are resolved.
- Operating revenue will be maximized by providing additional services, such as carrying freight that is compatible with the requirements of high-speed passenger rail service.
- The high-speed intercity rail system will be fully coordinated and connected with commuter rail lines and urban rail transit lines as well as other transportation services through the use of common station facilities whenever possible.
- To attain the safety record of high-speed trains in other countries, California's system must be entirely fenced and grade-separated (no rail/roadway intersections).

Southern Mountain Pass

The Commission recommends an Antelope Valley alignment for crossing the Tehachapi Mountains north of Los Angeles, instead of the I-5 (Grapevine) option. This recommendation is conditioned on the expectation that local contributions will significantly offset the additional costs and/or that there are considerable economic advantages to serving the longer Antelope Valley/Palmdale route.

Central Valley

Three potential alignments within the SR-99 Corridor include two existing railroad corridors and one new corridor. Ridership and revenue do not vary significantly across these three options. The new Corridor, however, would be the least costly. Perhaps the most important consideration within the Central Valley is whether the high-speed rail stations would be located within the existing downtown areas or in new, outlying areas. Public opinion favors locating stations in the existing downtowns; this can be accomplished using either the existing railroad corridors or a predominantly new alignment. While the SR-99 Corridor has been identified as the most promising route, selection of a precise alignment within the Corridor is dependent upon preliminary engineering and the environmental clearance process.

Northern Mountain Pass

Of the three northern mountain pass options (from south to north: the Panoche, the Pacheco, and the Altamont), the Commission recommends the Altamont Pass for linking the Central Valley to the greater San Francisco Bay Area. This option generates higher ridership and revenue for the system, and is less costly to construct than the two other mountain passes considered. The Altamont Pass route would connect the Stockton area with Newark in the East Bay and Redwood City on the San Francisco Peninsula, with service continuing north to SFO and downtown San Francisco. San Jose would be served directly with a high-speed rail line from Newark. Connecting service from Newark to Oakland is desired, but initially should be provided by station connections with existing services such as BART rather than dedicated high-speed rail service.

Service to San Diego and Sacramento

San Diego and Sacramento are integral components of the recommended system. Adding service to San Diego and Sacramento connects many more city pairs and nearly doubles the ridership and revenue expected of a less extensive system connecting only Los Angeles and the San Francisco Bay Area.

Service to San Diego

For high-speed rail service between Los Angeles and San Diego, the Commission recommends an inland route approximating Interstate 15 (I-15) and serving San Bernardino and Riverside Counties. An I-15 alternative, which will serve an area undergoing significant economic and population growth, would enjoy broad public support. In contrast, the existing LOSSAN Railroad Corridor (Los Angeles to San Diego via Orange County and

the southern California coastline) suffers from environmental constraints and challenges which have led to public opposition to high-speed service on this alignment. The LOSSAN Corridor appears to be best suited for incremental improvements to existing conventional rail service and should remain a vital part of the state's rail network.

Service to Sacramento

Two principal alignments were evaluated for connecting the Bay Area to Sacramento. The Commission recommends the Stockton route, which would branch from the SR-99 Corridor east of the Altamont Pass and continue north through Stockton to Sacramento. The Stockton option is preferable to the Capitol Corridor option for a number of reasons, including higher ridership, lower cost, better performance, and greater potential regional economic benefit.

Station Locations

While 29 station "service areas" and 47 distinct station site locations within those service areas were evaluated, the actual number of stations that would be constructed is far fewer. Nor will every train stop at every station on the line; rather, different levels of service would make different numbers of stops offering trade-offs between speed and accessibility. The conceptual operating plan assumes 14 stations between Union Station and downtown San Francisco.

Terminal Stations

The Commission recommends that the southern terminal for the Los Angeles-San Francisco segment be located at Los Angeles Union Station rather than LAX. Union Station offers higher ridership and revenues, as well as lower capital, operating, and maintenance costs. Union Station also has received greater public support to date and more readily accommodates future extension of service to San Diego. The Commission recommends, however, that future system planning consider a link from Union Station to LAX.

In the Bay Area, the high-speed rail system will terminate in both San Jose and San Francisco. Higher ridership and revenue projections, and the ability to directly serve the urban core recommend a northern terminal station at downtown San Francisco over Oakland alternatives. A San Francisco alignment would directly serve the region's most important travel destination as well as its most prominent airport at SFO.

System Phasing

The recommended high-speed rail system will serve over 90 percent of the population, encompassing California's major metropolitan areas: San Diego, Los Angeles, the San Francisco Bay Area, and Sacramento. The Commission considered alternative scenarios for phasing the construction of the system, including starting with either or both of the segments between Los Angeles and San Diego or San Francisco and Sacramento. However, these segments do not realize their full ridership potential unless connected to the

Los Angeles-San Francisco segment. To take advantage of financing supported by project revenues, the conceptual financial plan assumes that the system will be constructed in two phases over an eight-year period. The first phase, estimated to take five years, involves construction of the Los Angeles-San Francisco Bay Area segment. In the second three-year phase, the links to San Diego and Sacramento would be completed. According to the conceptual financial plan, revenue generated on the first phase segment would be available to support financing of the segments to Sacramento and San Diego. However, the new High Speed Rail Authority will need to revisit system phasing and cash flow analyses in more detail.

Economic Impacts

The merits of the high-speed rail system depend largely upon its economic feasibility. To determine the economic feasibility of the high-speed rail system, the costs of building the system are compared with the estimated economic benefits derived from the high-speed rail investment. Economic benefits include increased consumer surplus, reduced congestion, and net operating revenues. Analysis shows that the benefits of the recommended system exceed the costs; therefore, the project is considered economically feasible.

Analyses of the costs and benefits of a California high-speed rail system indicate that the system would generate significant net economic benefits over the life cycle of the project (on the order of \$3 to \$5 billion, depending on technology). The benefit-cost ratio of the system is only minimally affected by the choice of technology. Significantly, the benefits would accrue to a broad cross-section of the population, not only to high-speed rail users. By reducing congestion on other modes, high-speed rail will save California's taxpayers over \$1 billion annually in delay costs and other savings by the year 2020.

From another perspective, construction and operation of a high-speed rail system would generate a positive impact on the California economy. In terms of employment, construction of the system would generate 314,000 person-years of employment with VHS technology and 450,000 person-years of employment with Maglev during the total eight-year construction period. The system also will have a positive impact on land values around high-speed rail stations, with some \$1.7 to \$2.0 billion in value attributable to the system through the year 2020. Finally, by facilitating the development of lower cost housing, the system will increase California's attractiveness to both employees and employers. Upon completion, the system should provide a steadily increasing positive impact as high-speed rail operations improve California's competitiveness.

Financing Strategy

Detailed financial projections show that farebox and other revenues will not be sufficient to fully finance the Los Angeles-San Francisco system capital costs. While system revenues exceed operating costs by a healthy margin, the potential return on investment is insufficient to attract substantial private investment, given the inherent risks in such a large-scale project. Prices for competing modes would have to increase substantially for high-speed rail to capture enough of the market and/or charge high enough fares to change this conclusion.

The financing evaluation considered different levels of financial support. Seven possible sources were evaluated for the critical base funding source, and three have emerged as the most probable, given current assumptions about economic, financial, and political viability:

- Statewide retail sales tax;
- Retail sales tax levied only in counties served by the system; and
- Motor vehicle fuel excise or sales tax.

Other funding mechanisms studied include airport passenger charges and highway tolls. These mechanisms would not generate sufficient revenue to be considered a viable source of base funding. In addition, there are institutional obstacles that would need to be addressed in order for some of the more innovative financing strategies to gain credibility, such as restrictions on interstate highway tolls, jurisdiction over airport fees, and segregation of funds by mode.

Although private investment as a base funding source is unlikely in the foreseeable future, opportunities for private sector investments and partnering do exist. These include deferred compensation certificates for system construction and vendor financing of concession facilities. Local government participation is also an important source of financing, contributing towards, for example, station costs. These secondary and supplemental sources should be maximized, and the need for state funds reduced to the greatest extent possible.

The Commission recommends that implementation proceed under the assumption of base funding derived from public sources. Under the presently assumed financing plan, system revenues support a significant portion of the construction costs. Once the capital debt has been repaid, the system will generate substantial excess revenue that may be returned as income to the state or used to finance additional high-speed rail projects.

Ownership and Operation

Three basic options exist for an agency or authority to oversee high-speed rail implementation, including:

- An existing state agency;
- A joint-powers authority; or
- A special authority.

Additionally, three principal options for delivery of the project include:

- A traditional public works procurement;
- Design-build or design-build-operate contracting with primarily public financing; or
- A private concession to design-build-operate with varying degrees of public financial commitment.

Of these options, the most viable appears to be a special authority to oversee implementation, under a design-build or design-build-operate contracting relationship with a private sector entity. The private partner will share development risk in the form of performance guarantees.

Therefore, the Commission supports the creation of a High Speed Rail Authority, as specified by the recently enacted Senate Bill 1420. This new Authority has been given the broad powers necessary to move forward with high-speed rail implementation. However, the Commission strongly recommends that there be some continuity of membership between the present Commission and the new Authority.

■ Summary of Proposed System Characteristics

The purpose of this section is to set out in as much detail as possible the Commission's vision of where the system should run and how it should operate. The Commission believes that for high-speed rail to move forward, it is necessary to start with such a concrete vision and then adjust it as necessary. The Commission intends that the system recommended in this *Executive Summary* and in the *Summary Report and Action Plan* to serve as a blueprint for high-speed passenger rail in California, which may be modified at later stages of the project implementation process. It is critical to retain some degree of flexibility until the project is environmentally cleared and an agreement has been negotiated with a private partner. Thus, final route selections ultimately will be the responsibility of the High Speed Rail Authority. Table ES.1 summarizes some of the major characteristics of the recommended system.

The recommended system is almost 680 miles long and links all of California's major population centers: Sacramento, the San Francisco Bay Area, the Central Valley, Los Angeles, and San Diego (see Figure ES.1). As shown, the Los Angeles-San Francisco Bay Area segment extends from Los Angeles Union Station in Southern California to northern termini in the downtowns of San Francisco and San Jose. The route crosses the Tehachapi Mountains via an Antelope Valley route and serves the Central Valley with an alignment in the vicinity of SR-99. South of Stockton, the route enters the Bay Area via the Altamont Pass. Once within the Bay Area, the main line branches at Newark with one branch continuing across a newly constructed Dumbarton rail bridge and up the Peninsula (using the Joint Powers Board right-of-way) to downtown San Francisco. The other branch continues south from Newark to San Jose. An alignment from Stockton connects Sacramento to the system. Service between Los Angeles and San Diego utilizes an inland route approximating I-15 and serving San Bernardino and Riverside Counties.

Either the next generation of VHS steel-wheel-on-rail or Maglev technology will provide frequent service and fast travel times. Trains will travel at maximum operating speeds of nearly 220 mph for VHS technology or 310 mph for Maglev. Average operating speeds will, of course, be lower at about 150 mph for VHS technology between Los Angeles and San Francisco. Speeds in urban areas will be restricted to a maximum of about 125 mph. These speeds permit express travel times between San Francisco and Los Angeles of about 2 hours and 49 minutes with VHS technology and a little over two hours with Maglev.

Table ES.1 Recommended System Characteristics

	VHS System	Maglev System
Capital Cost (1996 \$billion)		
Los Angeles - San Francisco/San Jose ⁽²⁾	\$11.7	\$17.3
Los Angeles - San Diego	6.0	7.9
Stockton - Sacramento	1.7	2.4
Vehicle Cost	1.0	1.0
Support Facilities	0.3	0.3
Total	\$20.7	\$28.9
Ridership (Year 2015 Passenger Trips, millions)		
Los Angeles - San Francisco/San Jose	10.6	14.8
With Extensions	19.8	26.4
System Revenue (Year 2015, 1996 \$million)		
Passenger (Recommended System)	\$634.0	\$892.0
Net Freight	\$20.5	\$20.5
Net Concession	\$2.4	\$2.4
Total	\$656.9	\$914.9
Annual O&M Costs (1996 \$million)		
Los Angeles - San Francisco/San Jose	\$256.8	\$261.8
With Extensions	\$351.1	\$357.9
Base Funding Requirements		
Statewide Sales Tax Option		
Los Angeles - San Francisco/San Jose	1/4¢	3/8¢
With Extensions	1/4¢	3/8¢
Gas Tax (per gallon) Option		
Los Angeles - San Francisco/San Jose	5¢	7¢
With Extensions	6¢	8¢
Length (miles)		
Los Angeles - San Francisco/San Jose	460	460
Los Angeles - San Diego	158	158
Stockton - Sacramento	58	58
Total	676	676
Speed (mph)		
Maximum Speed (mph)	220	310
Average Speed (mph)	160	219

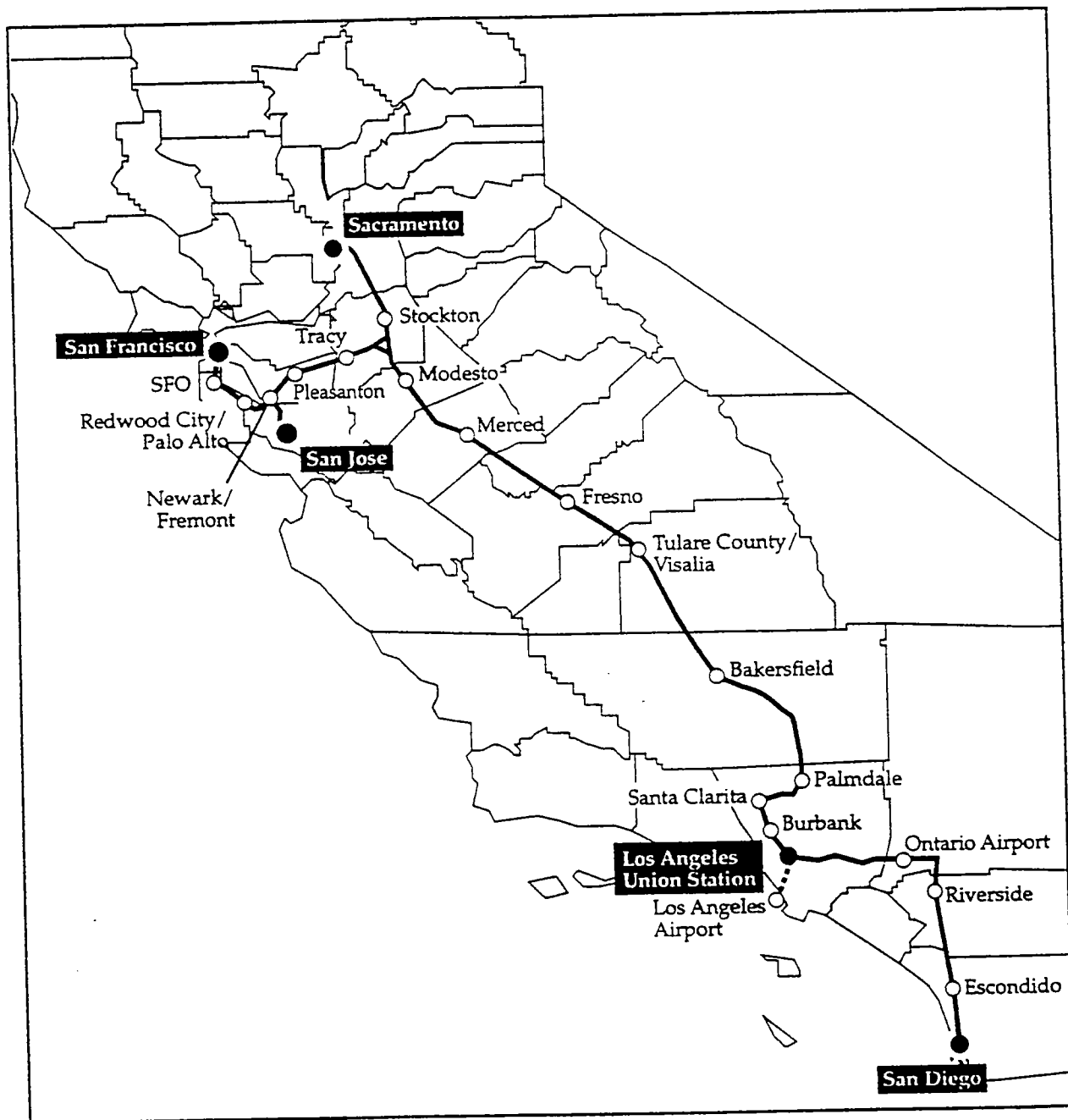
Table ES.1 Recommended System Characteristics (continued)

	VHS System	Maglev System
Express Travel Times (hours : minutes)		
Los Angeles – San Francisco	2:49	2:03
Los Angeles – San Jose	2:30	1:50
Los Angeles – San Diego	1:12	0:58
Los Angeles – Sacramento	2:31	1:53
San Francisco – Sacramento	1:21	1:03
Fresno – San Jose	1:04	0:44
Fresno – Los Angeles	1:29	1:07
Fresno – San Francisco	1:21	0:58
Bakersfield – San Francisco	1:52	1:19
Bakersfield – Los Angeles	0:58	0:45
Sacramento – San Jose	1:04	0:50

Notes: ⁽¹⁾Figures may not add due to rounding.

⁽²⁾Capital costs assume the new alignment option through the Central Valley.

Figure ES.1 Recommended System



Once fully operational, farebox and other revenues will exceed operating costs by a healthy margin. Capital costs range from \$20.7 billion for the VHS system to \$28.9 billion for a Maglev system. Most of the capital costs will need to be supported by a public funding source, such as a sales or gas tax, although the extensions will be financed predominately by system revenues. However federal and local monies, as well as private sector participation, also should contribute to the system's funding, thereby reducing the state's contribution to the greatest extent possible.

The Commission's final alignment recommendation described above differs from the route recommended in its draft *Summary Report* (September 1996). In response to public comments, the Commission altered their preferred route crossing of the Tehachapi Mountains from the I-5 Grapevine alternative to an Antelope Valley option. They also changed the recommended corridor between Los Angeles and San Diego from the coastal LOSSAN route to an inland I-15 Corridor. While the changes have considerable public support and serve areas projected to experience significant future population and economic growth, the two changes added nearly 80 miles to the alignment and increased the capital costs by about \$2 billion for VHS technology. The changes also reduced the projected ridership and surplus operational revenues due to slightly longer travel times between the major transportation markets.

Nevertheless, the base financing requirements did not change. However, if using retail sales tax, the Authority would need to identify another source to make up a projected \$325 million revenue shortfall for construction of the recommended VHS system (including extensions).

The new High Speed Rail Authority will oversee the next steps in the implementation process which include obtaining funding authority from the Legislature or voters, negotiation with a private partner, and the environmental clearance process. These steps are described in more detail in the following section.

■ Implementing the System

Over the past two years, the Commission has carefully studied high-speed rail from a number of perspectives and has set forth recommendations for the technology, corridor-level alignment, financing, and operation of the system. A number of high-speed rail projects in other states have reached this point and gone no further. High-speed rail would be a major infrastructure project that would be implemented over a ten to 15-year period, on par with building California's freeway system or water projects.

Senate Bill 1420 (SB 1420) created a new High Speed Rail Authority with the mandate to direct the development and implementation of intercity high-speed rail service in California. The new High Speed Rail Authority is to prepare a plan that would lead to construction and operation of a high-speed rail train network for the state, consistent with and continuing the work of the present Commission. The Authority also must prepare a detailed financing plan, specifying any taxes, fees, or bonds necessary to pay for the construction of the high-speed rail network. The Authority must seek and gain approval for the system and its base funding source by statute or voter approval by the year 2000.

The institutional and legal framework set forth by SB 1420, the significant costs of the preliminary engineering and environmental clearance phases, the degree of risk, and the likely painstaking process of building consensus for a high-speed rail system tend to favor a certain sequence of steps leading to implementation of high-speed rail. The Commission recommends the plan outlined below as the blueprint for its successor Authority to follow:

1. Obtain statutory authority and base funding source for the system.

There can be no significant progress on high-speed rail implementation nor can a private partner be selected until voters have approved a source of base funding. Thus, taking the necessary actions to secure funding is of paramount concern. In support of this crucial step, the Authority will initiate local coordination, begin statewide coalition building, establish a public outreach program, research legal and institutional issues, and draft language for a ballot measure. The Authority will use the time prior to placing measures on the ballot to develop a detailed financial plan in consultation with public finance and other experts as well as potential private partners. Concurrently, the Authority should also consider taking the following steps:

- *Employ a Request for Qualifications (RFQ) process to identify potential private partner consortia qualified to bid on the system design and construction.* This process will allow the Authority to tap the experience of these potential partners both in developing the ballot measure and in identifying other system specifications with an appropriate balance between specificity and flexibility.
- *Participate in the preparation of a comprehensive, statewide rail system plan.* The purpose of this plan would be to define the broad transportation context into which high-speed rail will fit. This plan may serve as a source of potential desirable transportation improvements to be integrated with high-speed rail in a balanced and coordinated funding measure.
- *Develop a procurement approach, the form of contract to be used in negotiations, and a Request for Proposals (RFP).* The Authority should involve industry representatives and retain a team of legal and financial advisors to assist in the procurement process.

2. Solicit and select private partnership in the project.

Once financing is secured, the Authority will advertise the Request for Proposals, select responsive teams for interview, conduct interviews, and designate a tentative franchisee. Negotiations then will be conducted to determine the final form of the agreement between the public and private partners. The Authority will be represented in the negotiations by its team of expert advisers.

3. Conduct preliminary engineering and environmental clearance.

Some degree of flexibility with respect to alignments and service patterns must be retained throughout the preliminary engineering and environmental clearance process. At the conclusion of this step, the Authority will have an environmentally-cleared preferred alignment and system configuration that will proceed to final design.

4. Initiate final design, construction, and start-up.

With the system alignment and confirmation approved, the Authority will oversee final design, system construction, and start-up of operations. There is substantial opportunity to decrease the total amount of time required for these phases by conducting certain tasks concurrently. For example, some construction can begin while other segments or components are in final design, and some system testing can be conducted before all construction is completed.

■ Conclusion

The Commission stresses that, to the best of its knowledge, no other transportation project in California has undergone such an extensive feasibility investigation as has this high-speed rail project. Peer-reviewed and widely accepted analytical methods including benefit-cost analysis and state-of-the-art travel demand forecasting and engineering analysis have shaped the conclusions and recommendations presented in this *Executive Summary* and in the *Summary Report and Action Plan*¹.

There is an urgency to addressing future travel demands now, because of the long lead times required to implement any major transportation infrastructure improvement. A limited amount of capital is available from private and public markets to support a project of this magnitude, and California is competing with other states, regions, and countries for capital investment. If not pursued now, implementation of high-speed rail will only become more difficult as potential alignments are developed and transportation facilities planned without the benefit of a comprehensive statewide plan for passenger rail services. If the State does not act decisively to pursue high-speed rail as part of a balanced and rational transportation investment strategy, this opportunity may be foreclosed.

At the same time, the high-speed rail system requires significant public support and funding for construction. Although the financing plan calls for a new dedicated source for base project financing, the Commission recognizes that the project will be competing with other state priorities such as education, prisons, and other transportation projects. Thus, the decision to build high-speed rail rests with the Administration, the Legislature, and the voters.

¹Chapters of the *Summary Report and Action Plan* provide a much more detailed description of the various study assumptions, methodologies, findings, and recommendations. Detailed technical studies and appendices are available for review by interested members of the public. For more information, please see Appendix C.

1.0 Introduction

1.0 Introduction

This report presents the work of the Intercity High Speed Rail Commission, charged with assessing the feasibility of a high-speed passenger rail system for California and preparing a 20-year implementation plan. After presenting background information on the Commission, the various technical studies supporting the Commission's work, and high-speed rail around the world, this chapter concludes with a discussion of historical perspective and the rationale for investing in high-speed rail.

■ 1.1 High-Speed Rail for California

1.1.1 Enabling Legislation

Executive Order W-48-93, issued by the Governor in early 1993, called for the establishment of a task force to study the feasibility of implementing a statewide, high-speed rail system. *Senate Concurrent Resolution 6 (SCR 6)*¹ authorized a nine-member Intercity High Speed Rail Commission to develop a framework for implementation over a 20-year time horizon. Subsequently, the Governor appropriated funds for the Commission established under SCR 6. According to SCR 6, the State is to have a "comprehensive network of high-speed rail by the year 2020" with construction to commence by the year 2000. A segment linking the San Francisco Bay Area with greater Los Angeles is designated as the first priority segment with service to Sacramento, Orange County, and San Diego by the year 2020.

SCR 6 specifies that the Commission focus on provision of intercity service; that the 20-year plan designate an entity with a stable and predictable funding source to implement high-speed rail; and that a public-private partnership finance, build, and operate the system. The final plan is to be submitted to the Governor and the chairpersons of the Senate and Assembly Committees on Transportation by the end of 1996. The legislation refers to California's earlier freeway plan in its mandate to develop a visionary transportation planning document.

¹Please refer to Appendix A for the complete text of SCR 6.

1.1.2 Intercity High Speed Rail Commission

The Intercity High Speed Rail Commission consists of four members appointed by the Governor, two members appointed by the Senate Committee on Rules, two members appointed by the Speaker of the Assembly, and the Secretary of Business, Transportation and Housing, who serves as chairman. The members were chosen for their knowledge and experience in transportation engineering, business administration, financing, environmental protection, high-speed rail service, and the aerospace industry. A brief biography of the Commission members may be found in Appendix B.

To carry out its mandate, the Commission has directed a series of focused technical studies related to high-speed rail feasibility in California (these are described in the next section). Using the information generated by these studies, the Commission formulated this Summary Report and Action Plan. Over the past two years, the Commission has also presided over a number of public meetings at which study results were presented and Commission policy formulated. The Commission's findings and recommendations are documented in Chapter 8.0 of this report. The Commission will sunset upon submittal of its report to the Governor and legislature.

The Commission conducted the studies and prepared this report with several objectives in mind:

- **Determine Feasibility/Advisability** – The Commission set out to determine both the feasibility and advisability of implementing high-speed rail in California. The concept of feasibility encompasses civil engineering and environmental constraints, financial requirements, and political acceptability. The concept of advisability addresses public policy issues such as economic costs and benefits and social equity in addition to broader questions. For instance, “Should high-speed rail be part of California’s landscape and transportation system?” and “How will high-speed rail impact California’s competitiveness and quality of life?”
- **Set Implementation Framework** – The Commission was also charged with setting out a framework for implementation and laying out the interim steps towards high-speed rail implementation. These interim steps include the specific legislative actions required and designation of an entity to carry high-speed rail implementation forward. The existing Commission does not have the mandate to continue as the implementing entity.
- **Retain Flexibility** – Another objective of the Commission was to strike the correct balance between flexibility and specificity. High-speed rail implementation will take place over an extended period, during which unforeseen economic, technological, or political changes could occur. While the Commission’s recommendations must be detailed enough to permit further action, the plan must not be so prescriptive as to rule out potentially beneficial changes (for example, improved technology or increased private investment interest in certain routes).
- **Foster Intermodal Connectivity** – It is apparent that if a “focused and phased approach” to high-speed rail implementation is to be successful, the study must be coordinated with the State’s existing Passenger Rail Program and other transportation systems. High-speed rail and conventional rail services are not separate systems but

rather integrated parts of a network. Prudent and strategic investment will benefit both intercity high-speed rail and commuter or conventional rail services. Grade separations, electrification, signaling and communication upgrades, and station improvements are examples of investments that could be shared by high-speed and other rail systems, especially in the urban areas.

1.1.3 Technical Studies and Community Outreach Program

Under the direction of the Commission, a series of technical studies was undertaken to address the objectives described above and to support the preparation of a 20-year plan for high-speed rail implementation. Each study focused on a different aspect of high-speed rail feasibility or implementation and is briefly described below. Names of the prime contractors responsible for each technical study are in parentheses.

- **The Los Angeles – Bakersfield Preliminary Engineering Feasibility Study** (Parsons Brinckerhoff)² analyzed the feasibility of constructing a high-speed rail crossing of the Tehachapi Mountains in Southern California. The study produced an evaluation of the various high-speed rail technologies as well as engineering drawings, cost estimates and preliminary environmental analysis for potential alignments traversing the Tehachapis. The study also produced drawings and cost estimates for potential stations, developed operating plans, and estimated travel times for this segment of the statewide corridor. Work performed for the Los Angeles – Bakersfield study provided an important foundation for the Corridor Evaluation study, described below.
- **The Corridor Evaluation and Environmental Constraints Analysis** (Parsons Brinckerhoff) was conducted in three phases. The first phase defined the most promising alignments for linking the San Francisco Bay Area and Los Angeles. During the second phase, these alternative alignments were examined in more detail. The third phase examined potential high-speed rail system extensions to Sacramento, San Bernardino/Riverside, Orange County, and San Diego. The study identified station locations; estimated travel times; developed construction, operation, and maintenance cost estimates; analyzed environmental constraints and possible mitigation measures; and, in an iterative process with the Ridership Study, developed a conceptual operating plan.
- **The Ridership Demand/Market Analysis Study** (Charles River Associates) prepared ridership and revenue forecasts for various high-speed rail system configurations. This effort included compilation of existing data on California's intercity travel markets and economic and demographic trends, as well as surveys of intercity air, auto, and rail travel in California. A set of advanced travel demand forecasting and mode choice models were prepared using the new survey and market data. Sensitivity analyses assessed the impact of different assumptions about growth rates and fares on

²Proposition 116 funded this study, which was initially directed by Caltrans District 7 with staff support from Caltrans Division of Rail. The study was later subject to the direction of the Commission.

the ridership and revenue forecasts. The Ridership Study provided critical inputs to the Economic Impact and Financing Options studies.

- **The Economic Impact and Modal Cost Comparison** (Economic Research Associates) investigated the economic impact of high-speed rail on the state and local economies, conducted a cost-benefit analysis of the proposed system, and evaluated the potential for high-speed rail to reduce infrastructure spending for the existing intercity travel modes. This study provided important information critical to the Commission's policy making process.
- **The Institutional Analysis and Financing Options Evaluation** (Public Financial Management, Inc.) identified the various state, federal, and local entities that would influence the development of a high-speed rail system in California; assessed the various financing mechanisms available; and developed public-private partnership models with associated financing plans. A key objective of this study was to assess the financial feasibility of the proposed high-speed rail.
- **A Public Participation Program** (Consensus Planning Group) ensured that private citizens, local government, and regional planning agencies were included in the high-speed rail planning process. The program arranged public workshops and hearings, produced newsletters and a presentation video, and coordinated the collection and disposition of public comments over the course of the technical studies. Please see Appendix D for documentation of the Public Participation Program.

1.1.4 The Summary Report and Action Plan

This **Summary Report and Action Plan** (Cambridge Systematics, Inc.) includes a distillation of the most important findings of each technical study that guided the conclusions and recommendations of the Commission. Each of the technical studies generated a large volume of technical memoranda, draft reports, and other documentation in addition to a final summary report. A comprehensive list of technical study outputs is included in this report as Appendix C. Readers wishing more detail on a specific technical topic may refer to this appendix for information on the format, content, and source of each technical document as well as how to obtain copies of the materials.

The Summary Report and Action Plan (the Plan) is the culmination of the technical studies, the public participation program, and the work of the Commission. In drafting the Plan, the Commission and its staff drew heavily upon the technical study findings but also applied the experience and judgment of the Commissioners. As specified in SCR 6, the Plan includes identification of "corridors to be served, and financing and implementation strategies for the development, construction, operation, and maintenance of the high-speed ground transportation system."

A draft of the report was circulated to local governments and agencies, community groups, legislators, and other stakeholders for a review and comment period. In October 1996, the Commission held a series of three public hearings on the draft Plan at various locations throughout the State. Following the hearings, the Commission finalized its findings and recommendations, taking into consideration the comments and input received on the draft. The revised, final Summary Report and Action Plan will be submitted to the Governor and State legislators by December 31, 1996.